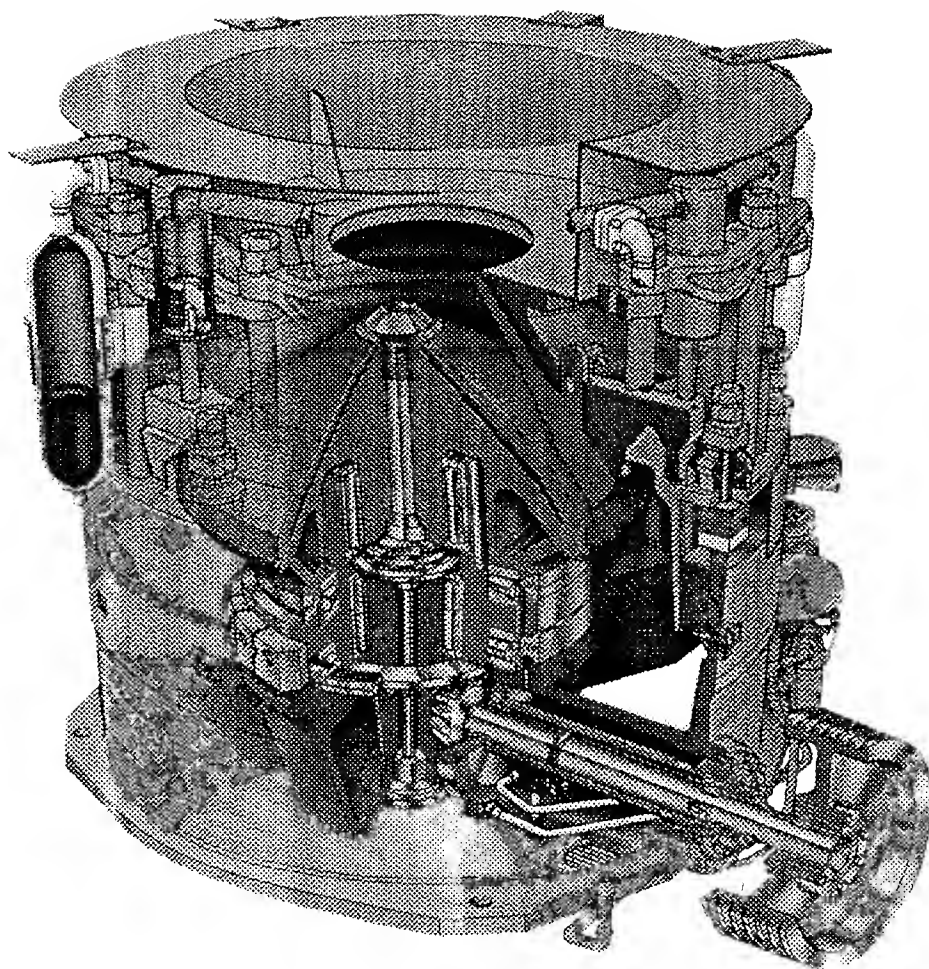


**Daftman™**



*A Technical Manual for the*

## NM-156 Reciprocating Emu Press

Complete mechanical diagrams, electrical schematics, and operating instructions

The purpose of this manual is two - fold. First, in order to get a better appreciation for freshly squeezed - emu juice, you should acquaint yourself with the entire process of producing it. This manual details every step of the way - from live animal to fresh, sparkling juice. Secondly, there is no doubt you will put your NM-156 Reciprocating Emu Press through rigorous use. As with any mechanical device, a little bit of maintenance goes a long way. We offer this manual both for the beginner and the more advanced emu press technician.

In the preparation of **freshly** squeezed - emu juice, please note the emphasis on the word fresh. It is recommended that you obtain your emus live to insure the freshest possible product. The emus should be shipped, by truck, exactly as shown in Figure 1.73

Diagram of a truck with a rectangular load on its bed. The load is 0.5 m wide and 0.6 m high, with a center of mass 0.5 m from the left edge. The truck bed is 4.0 m long and 1.2 m high. The truck's center of mass is 2.5 m from the right end of the bed. Gravity  $g$  acts downwards.

Your NM-156 Reciprocating Emu Press comes fully assembled. All that you need to do is plug one end of the supplied electrical cord into the unit and the other end into an available 220V AC (alternating current) electrical socket. Please observe the correct polarity when connecting the power cord.

At the back of the unit is a circuit breaker. If you plug the unit in and it does not operate, make sure that the knife switch inside the breaker box is thrown into the "ON" position. When replacing the fuses, use only the same amperage, fast-blow, fuses.

The master power switch is located inside the operating panel door. The large, rotary switch on the operating panel selects either manual or automatic operating modes. When set to "Automatic", all the other operational controls (except for the master power switch) are disabled.

The hatch to the tilling chamber - where you insert the fresh emu - is painted red and has a spinning flywheel on it. To open, spin the flywheel in a counter-clockwise direction until the wheel touches the retaining nut. You should then be able to open the chamber door by pulling on the "Release" lever. To close the door after loading the animal, push on the lever until it snaps into place. Finally, spin the flywheel clockwise until it touches the base of the retaining bolt.

You are now ready to make juice! Enjoy!

### Computer Control Unit

The NM-156 Reciprocating Emu Press is controlled by a sophisticated microprocessor-based computer system. The system is built around the newest Intel 8086/8088 microprocessor chip capable of carrying out thousands of computing operations each second. The microprocessor has a hefty 16 Kilobytes of onboard memory. Figure 2.32 illustrates the control system's central processing unit (CPU). The flow of a sample operation through the processor's logic circuits is shown in Figure 2.68.

The processor then communicates to various subsystems of the press (tilling subsystem, tumbler system, pressing subsystem) through a series of logic gates, all operating via RLL and MFM interfaces. (Please see Figs. 2.71, 2.72, 2.73, 2.77 for detailed schematics.)

In the event of an emergency, the microprocessor is hardwired into the electrical system's bipolar grounding mechanism (Fig. 2.93). If the microprocessor senses a situation which it deems an emergency, it immediately shuts down and reroutes all current to the grounding system.

If the press ever shuts down in this manner, please wait at least five minutes for all the current to drain out of the system before restarting the unit. To restart, open the Manual Restarting Panel - located below the Juice Chamber Drain - and turn the starting crank clockwise between 15 and 20 revolutions. The status lights should return to their normal operating status and the press should be ready for use.

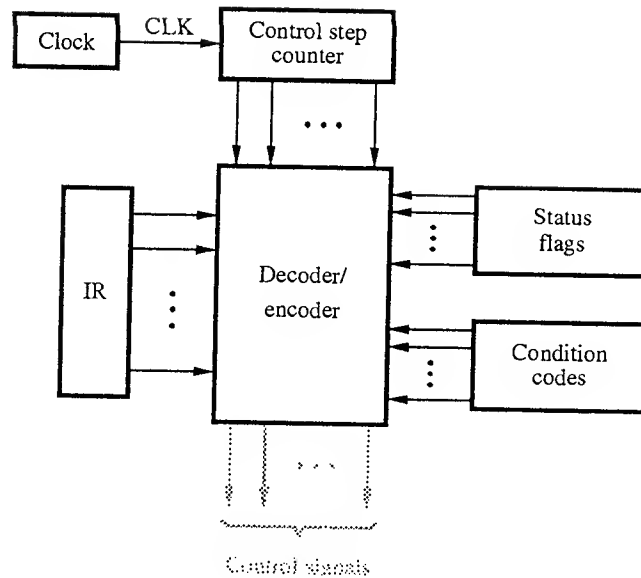


Figure 2.32 Central Processing Unit (CPU) of the Computer Control Unit

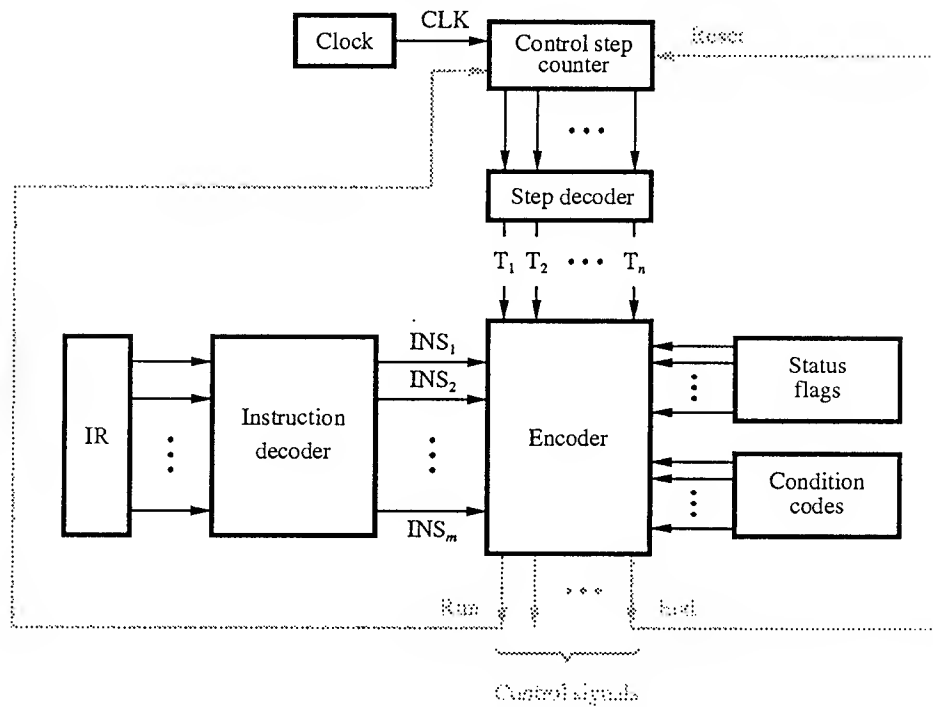


Figure 2.68 Sample logic operation illustrating encoder and decoder logic algorithms.

## RLL/MFM Logic Gate Interfaces

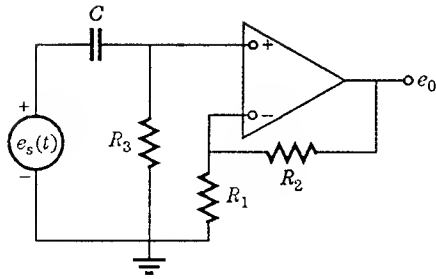


Figure 2.71 Tilling system interface

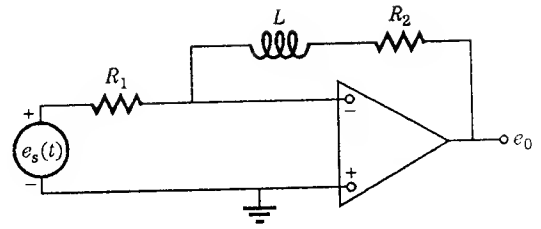


Figure 2.72 Tumble system interface

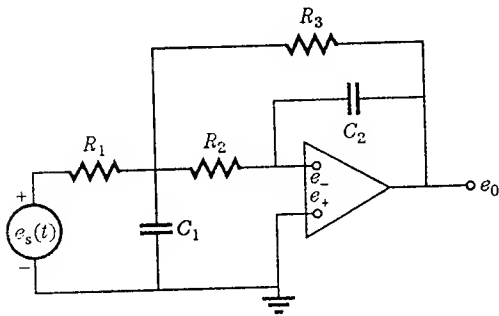


Figure 2.74 Press system interface

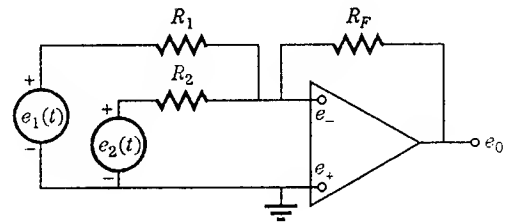


Figure 2.73 Electrical and Operation panel interface

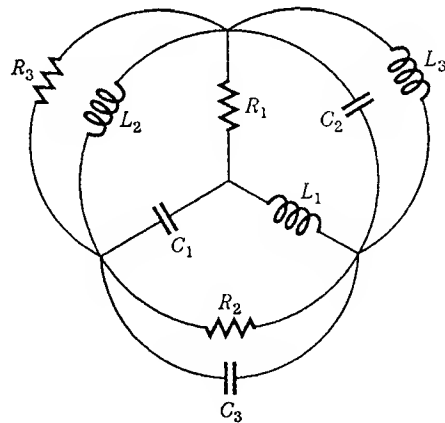


Figure 2.93 Electrical system Bipolar Grounding Mechanism

### Stage 1: Till Cycle

The first stage in the processing of fresh emus involves breaking up the entire animal into smaller, more manageable pieces. Not only do smaller pieces, or emu aggregates as they are referred to, inflict less wear and tear on the press, but they also expose more of the animal's area from which to obtain juice. This initial stage is known as the Tilling Stage.

Tilling takes place in the press's tilling chamber. The animal is introduced into the chamber at one end and is subsequently moved to the other end. Along the way, the animal is broken up into the smaller emu aggregates.



Figure 3.01 External view of Tilling Chamber.

Inside the chamber, a series of three spinning disks minces the whole animal. At the end of the process, a given sample emu aggregate measures no more than 4.5 cm in diameter. Figure 3.17 shows the interior of the tilling chamber. Note the pistons and springs which connect the spinning disks; these provide adequate "play" in disk motion to prevent the disks from being damaged by particularly tough bones and cartilage.

The entire chamber rests on sub-foundation/weighing-table unit. This unit takes instantaneous measurements of the total weight of all the emu aggregates (and derived fluid) and fine-adjusts the disk rotor's transmission gear ratios to achieve optimum tillage.

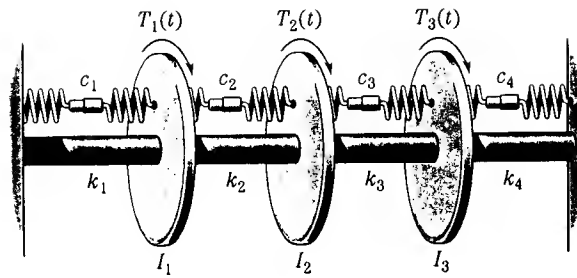
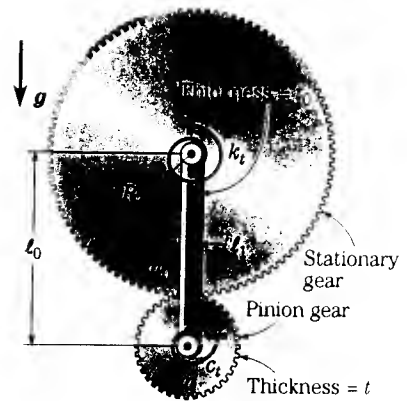


Figure 3.17 Internal view of the tilling chamber. Side view is at right.



The disk rotor's transmission system consists of a number of gears interconnected via springs and frictionless rollers. These gears, in turn, are connected to the main transaxle, thus providing the rotating motion for the tilling disks. The transmission (Fig. 3.30) provides 2 gears: a high gear for finer emu aggregates and a lower gear for either larger or particularly troublesome emu aggregates. Low gear is realized by the positioning of spring  $k$  just above spring  $k_2$  (see Fig. 3.30). To shift into high gear, spring  $k$  is repositioned below spring  $k_2$ . Clutching and subsequent shifting is done automatically by the shift mechanism shown in Figure 3.41.

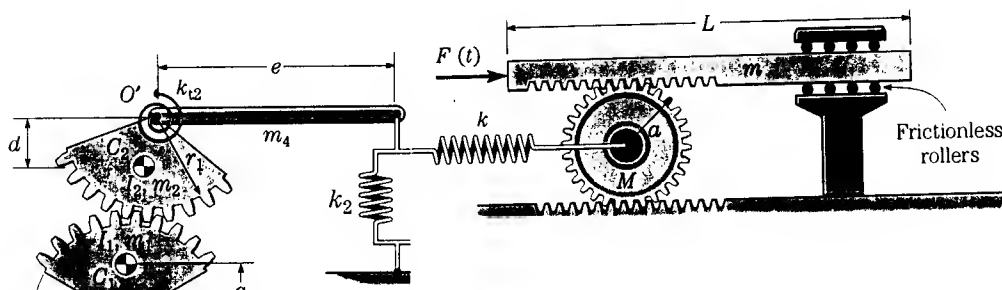


Figure 3.30 Disk rotor transmission

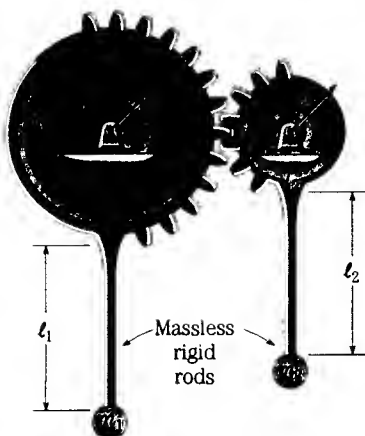


Figure 3.41 Shift mechanism

As has been mentioned previously, fine tuning of the gear ratios utilized in the process occurs via the weighing-table sub-foundation. The sub-foundation can adjust the gear ratios by as much as  $\pm 15\%$ . Figure 3.23 illustrates the sub-foundation. Note that the weight of the block connected to spring  $k$  is variable. The weight can be changed to suit your individual needs. Weight Block Kits (part #344-A23c) must be ordered separately. However, for most applications, the supplied block is all that is needed.

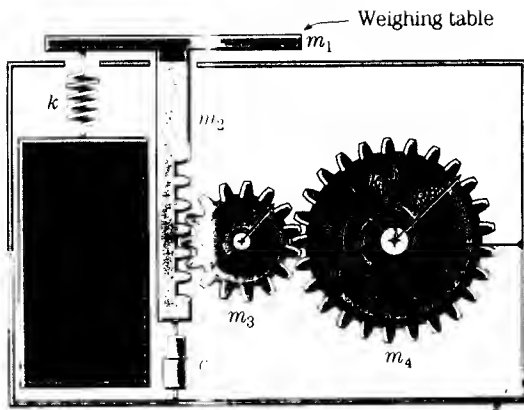
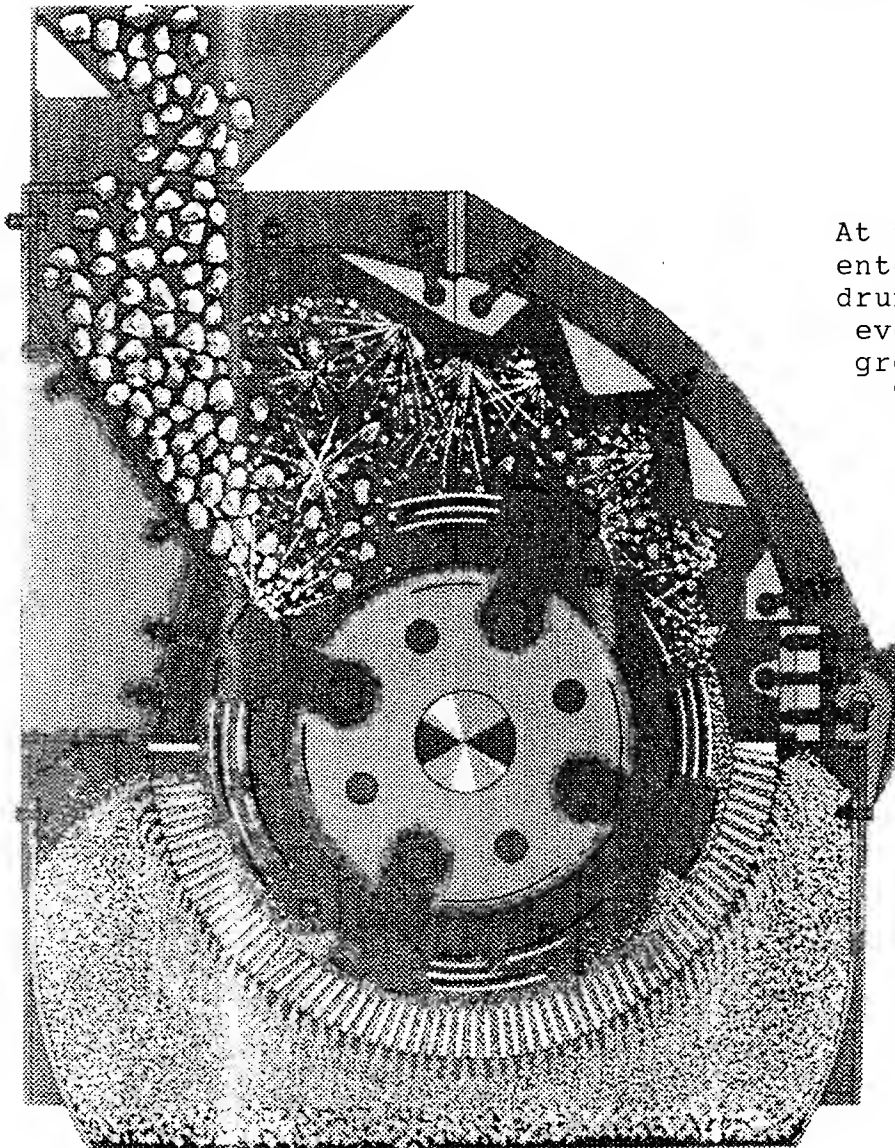


Figure 3.23 Weighing table sub-foundation

After the animal is processed in the tilling chamber, it is ready to move onto the next step in the process. At this point, the whole emu has been converted into perhaps hundreds of emu aggregates. Also present in the tilled product is a sufficient quantity of emu fluid. This should not be mistaken as emu juice. By order of the FDA, no fluid derived solely as a product of the tilling stage may be marketed as emu juice. Conversely, the resultant fluid may be drained of and sold as Extra Virgin Emu Fluid. However, to prepare true emu juice, it is recommended to leave the tilled fluid in with the aggregates and continue processing.

### Stage 2: Tumble Cycle



At the time the emu aggregates enter the tumble chamber, the drum starts to spin in order to evenly distribute the emu aggregates throughout the chamber. The drum continues to rotate throughout the entire tumble cycle. At the same time, the drum's movement is further influenced by the Worthington-Smyres Triple Rotor. The Rotor uses 3 (three) motors - connected to the same electrical circuit - to provide motion in the X, Y, and Z planes.

The purpose of this stage of the process is to bruise the emu aggregate into a softer, more pulp state. This is similar to the bruising of apple before pressing them in a cider press.

Figure 4.01 External View of the Tumble Chamber



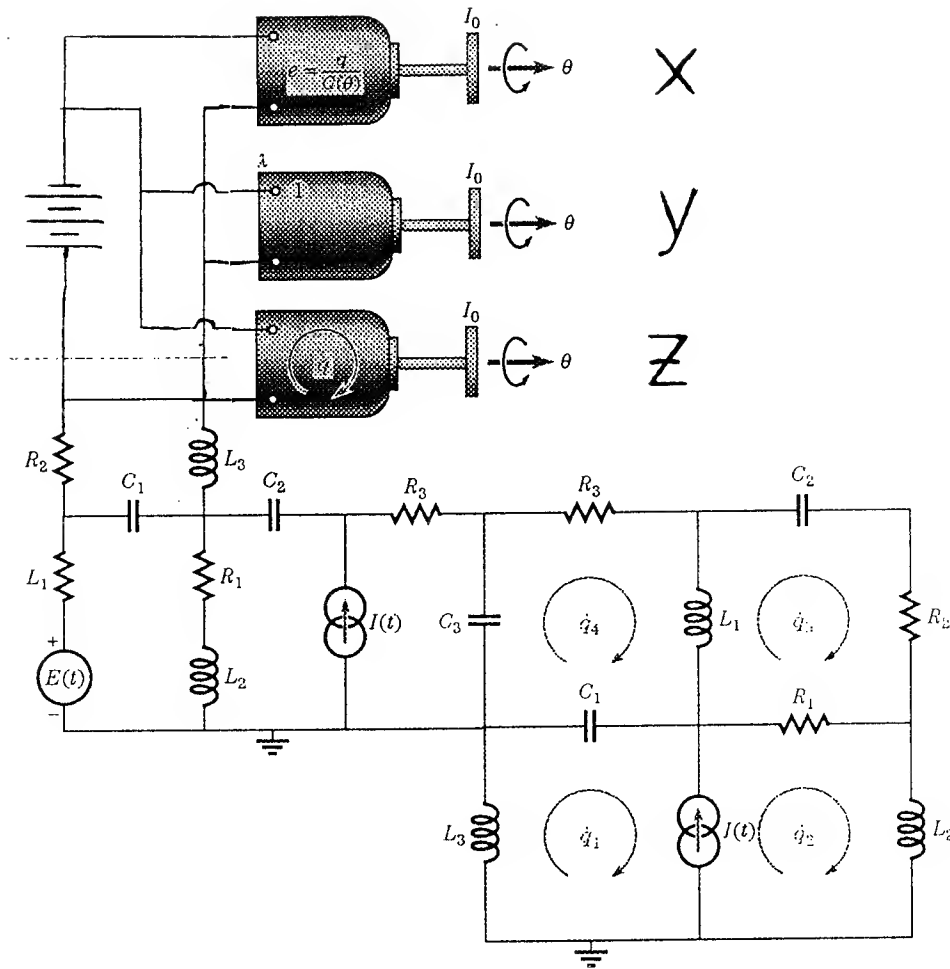


Figure 4.75 Electrical schematic of the Worthington-Smyres Triple Rotor.

$$\delta \mathcal{W}^{\text{nc}} = \sum_{h=1}^N \mathbf{f}_h^{\text{nc}} \cdot \delta \mathbf{R}_h + \sum_{i=1}^{M'} i_i^{\text{nc}} \delta \lambda_i = \sum_{j=1}^{n_{\text{eq}}} \Xi_j \delta \xi_j + \sum_{k=1}^{n'_k} \mathcal{I}_k \delta \lambda_k$$

Figure 4.83 The Worthington-Smyres Work Formula. This equation determines the sum total of the X, Y, and Z forces. The resultant value, called the Pemberton-Pratt Subaudible Crushing Coefficient, is the quantifiable expression of subaudible stress induced on the emu aggregates in order to crush them.

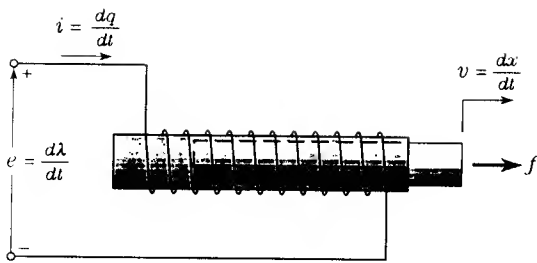


Figure 5.12 Simplified schematic of current flow through inductor core to provide power for the press.

### Stage 3: Press Cycle

After the emu aggregates have been tumbled, they are separated from the fluid portion and placed on a short conveyor belt. The belt moves only a specified amount of aggregates at a time through the series of three presses. Much like the tumble cycle, an emu aggregate is acted upon by forces in the X, Y, and Z planes.

The power necessary to complete this stage is delivered from the unit's main magnetic / inductor coil. Figure 5.12 illustrates the flow of current through the inductor; for a more detailed view of the magnetic / inductor coil, please see the 'Service' section.

The emu aggregates first pass through the inductor-driven press assembly where force is exerted from the X plane. The inductor-driven press (Fig. 5.28) receives power directly from the magnetic / inductor coil. Conversely, power to the second (Y-plane) press is transferred indirectly from the magnetic / inductor coil via the spinny-magnet assembly (Fig. 5.29).

At this point, the operator should read the pressure gauges

Similar to the completion of the tilling cycle, fluid derived as a result of the tumble cycle should not be mistaken as freshly squeezed - emu juice. However, it may be drained off and marketed as Virgin Emu Fluid. To obtain freshly squeezed - emu juice, the minced and tumbled animal must be processed in the final, or press, cycle.

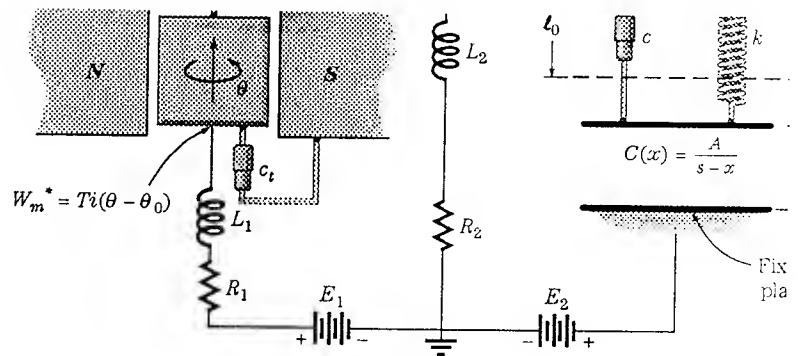


Figure 5.29 Magnetic-driven press element (Y-Plane).

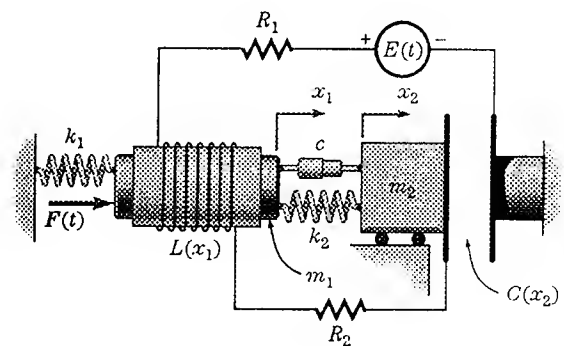


Figure 5.28 Inductor-driven press element (X-plane).

located on the operating panel. The gauges indicate pressure (in dyne / cm) applied by the inductor - driven press, the magnetic - driven press, and the resultant vector of pressure of both presses.

The final step in the press cycle involves the (hand) lever - driven Z-axis press. First, you must compensate for the angle of the resultant X-Y pressure vector. The lever spins a full 360 degrees to allow for a precise correction angle. Secondly, with the lever in a level position, apply a steady and constant 3 lbs.ft. of pressure up on the lever while watching the resultant X-Y pressure gauge. Keep pulling the lever until both the angle and pressure read 0.

Lock the lever in place by fitting the orange cotter-pin (which swings freely from a chain connected to the lever shaft when not in use) into the hole on the lever arm.

On the operation panel, turn the fluid release knob counter-clockwise to release the previously seperated fluid into the collection chamber. If you like emu pulp in your freshly squeezed - emu juice, you may unlock the Z-press lever to allow pressed solids into the collection chamber.

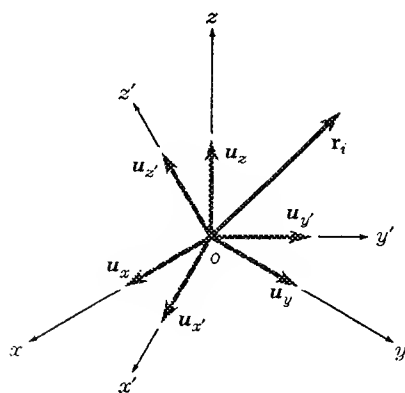


Figure 5.86  
Splatter pattern of individual emu aggregate (Note: X, Y, and Z forces superimposed onto each other.)

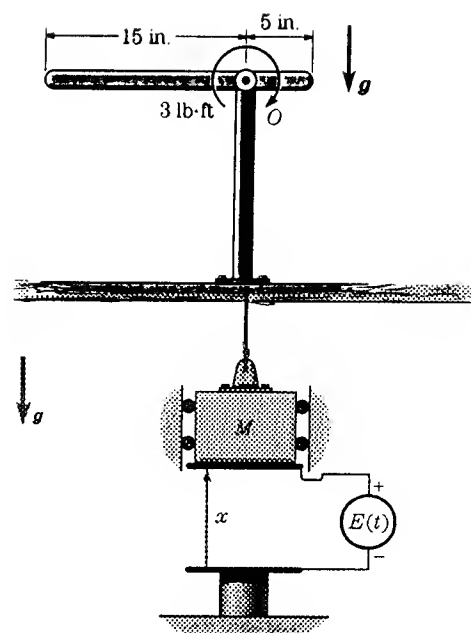


Figure 5.30 Lever-driven press element (Z-Plane).

At this point, mix the juice thoroughly by pushing the green button labelled "Mixer". The button will illuminate when the collection chamber is mixing. Mixing takes approximately 3 minutes for non-pulpy juice or 5 minutes for pulpy juice.

Shortly after the mixer switches off, the collection chamber will stop rotating. When it comes to a complete halt, place a large pot under the drain plug to catch the freshly squeezed - emu juice.

To open the drain plug, loosen it with a 15mm wrench (supplied) or socket.

Congratulations! You can now enjoy your freshly squeezed - emu juice!

## Service

Your Daftman™ NM-156 Reciprocating Emu Press features sealed bearings and CV boots. Should they ever need servicing, take your press to a certified emu press technician. User-serviceable parts are confined to the emu processing tract. That is, any part that comes in contact with the emu throughout the stages of processing can be serviced by the user. Additionally, we recommend adhering to the following maintenance schedule:

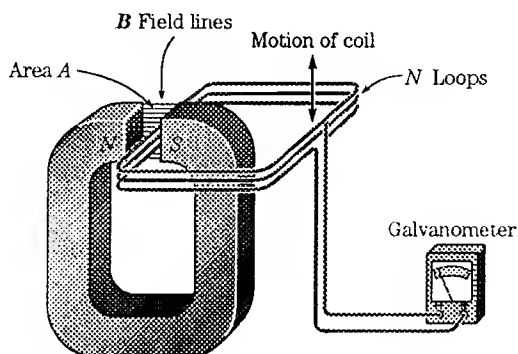
Galvanometer check:	monthly
Drainage/Collection system:	after every 4th emu
Tiller disk-truing:	3 months / 36 emus

Each of the preceding maintenance procedures is described in detail in the following sections. Should you need further assistance, feel free to call our 24 hour technical support hotline.

### Galvanometer check

The purpose of this procedure is to determine the magnetic coil potential of the press's main inductor coil/magnet assembly. This potential is measured in units called 'galvans'. To check the galvan count of your unit, open the service panel on the back of the unit. Use a dime or your fingernail to unscrew the flush-mount retaining screw. The door should easily detach from the case.

**NOTE:** Do NOT put your fingers or shiny, metal objects in between the N and S poles of the magnet. Do NOT look directly at the magnetic field lines. Failure to observe these warnings may cause permanent blindness and substantial damage to the unit!



Connect the positive lead of your galvanometer to the first (top) N-Loop. Now connect the negative lead to the third (bottom) loop. Read the value on your meter and compare it with the values in table 7.2. Should your galvan count fall outside accepted values, table 7.2 illustrates the adjustments that need to be made. (Please pay particular attention to the polarity of the circuit, especially when calculating the flux linkage state functions.)

## Fluid Drainage and Collection System

The entire fluid drainage and collection system is detailed in figure 7.82. To clean the system, insert a compressed-air hose into the fluid discharge valve at the front of the unit. (This is where your freshly squeezed - emu juice flows out during normal operation of the unit.) Open the Press chamber door by pulling out the cotter pin from the 1 7/8 - inch bolt on top of the door. Pull on the bolt - it is spring loaded - until the door opens. Let compressed air flow through the entire system for 20 minutes. **CAUTION:** Do not use more than 72 psi of compressed air. Pressures greater than this can rupture fluid lines!

## Tiller Disk-truing

The tilling chamber disks are interconnected via springs and pistons to allow for 'play' in response to tilling of the emu's bones, cartilage, and other tough tissues. This play insures that the entire disk drive mechanism resists stress which may cause the drivetrain to break.

However, with time and use, this safety system may need readjusting as the wheels move laterally so much that they do not spin properly. Figures 7.31 and 7.32(a) illustrates a trued tiller disk. Figure 7.32(b) shows the maximum allowable angle,  $\theta$ , that any individual tiller disk may lean before damage to the chamber occurs.

TABLE 7-2 Galvanometric adjustment values.

	Charge Formulation	Flux Linkage Formulation
<ul style="list-style-type: none"> <li>Generalized Coordinates</li> <li>Lagrangian</li> <li>State Functions</li> </ul>	$q_k \quad k = 1, 2, \dots, n_e$ $\mathcal{L}(q_k, \dot{q}_k) = W_m^* - W_e$ Linear: $W_m^* = \frac{1}{2} L \dot{q}^2$ $W_e = \frac{q^2}{2C}$ Nonlinear: $W_m^* = \int_0^q \lambda d\dot{q}$ $W_e = \int_0^q \dot{\lambda} dq$	$\lambda_k \quad k = 1, 2, \dots, n'_e$ $\mathcal{L}(\lambda_k, \dot{\lambda}_k) = W_e^* - W_m$ Linear: $W_e^* = \frac{1}{2} C \dot{\lambda}^2$ $W_m = \frac{\lambda^2}{2L}$ Nonlinear: $W_e^* = \int_0^{\dot{\lambda}} q d\dot{\lambda}$ $W_m = \int_0^{\lambda} \dot{q} d\lambda$
<ul style="list-style-type: none"> <li>Work Expressions</li> </ul>	$\delta \mathcal{W}^{nc} = \sum_{j=1}^M e_j^{nc} \delta q_j = \sum_{k=1}^{n_e} \mathcal{E}_k \delta q_k$ Resistor (Linear) $-R\dot{q}\delta q$ Voltage Source $E(t)\delta q$ Current Source No Work Expression: KCR Admissibility Operational Amplifier Akin to Voltage Source Plus Idealized Characteristics	$\delta \mathcal{W}^{nc} = \sum_{j=1}^{M'} i_j^{nc} \delta \lambda_j = \sum_{k=1}^{n'_e} \mathcal{I}_k \delta \lambda_k$ $-R^{-1} \dot{\lambda} \delta \lambda$ No Work Expression: KVR Admissibility $I(t)\delta \lambda$ Akin to Voltage Source Plus Idealized Characteristics
<ul style="list-style-type: none"> <li>Equations of Motion</li> </ul>	$\frac{d}{dt} \left( \frac{\partial \mathcal{L}}{\partial \dot{q}_k} \right) - \frac{\partial \mathcal{L}}{\partial q_k} = \mathcal{E}_k$ $k = 1, 2, \dots, n_e$	$\frac{d}{dt} \left( \frac{\partial \mathcal{L}}{\partial \dot{\lambda}_k} \right) - \frac{\partial \mathcal{L}}{\partial \lambda_k} = \mathcal{I}_k$ $k = 1, 2, \dots, n'_e$
<ul style="list-style-type: none"> <li>Linear Constitutive Relations</li> </ul>	Capacitor: $q = C\dot{\lambda}$ Inductor: $\lambda = L\dot{q}$	Resistor: $\dot{\lambda} = R\dot{q}$
<ul style="list-style-type: none"> <li>Linear Op-Amp</li> </ul>	Voltage-Transfer Characteristic: $e_0 = A(e_+ - e_-)$	

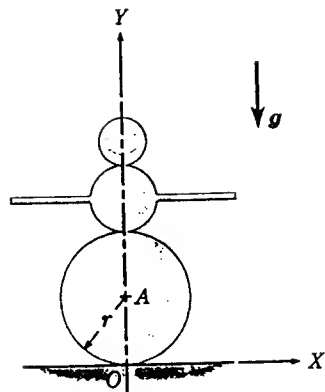
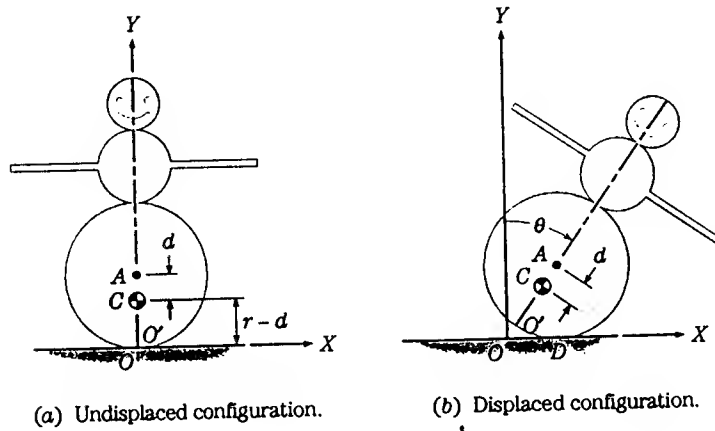


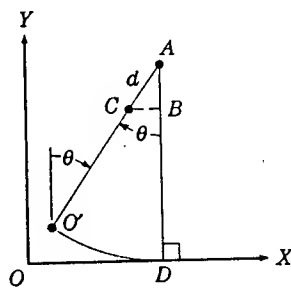
FIGURE 6-31 Rocking snowman toy.

Figure 7.31 True tiller disk.



(a) Undisplaced configuration.

(b) Displaced configuration.



(c) Expanded view of displaced centerline  $AO' = r$ .

FIGURE 6-32 Geometric variables and parameters for rocking snowman toy.

Figure 7.32 Diagram of trued tiller disk and critical angle,  $\theta$ .

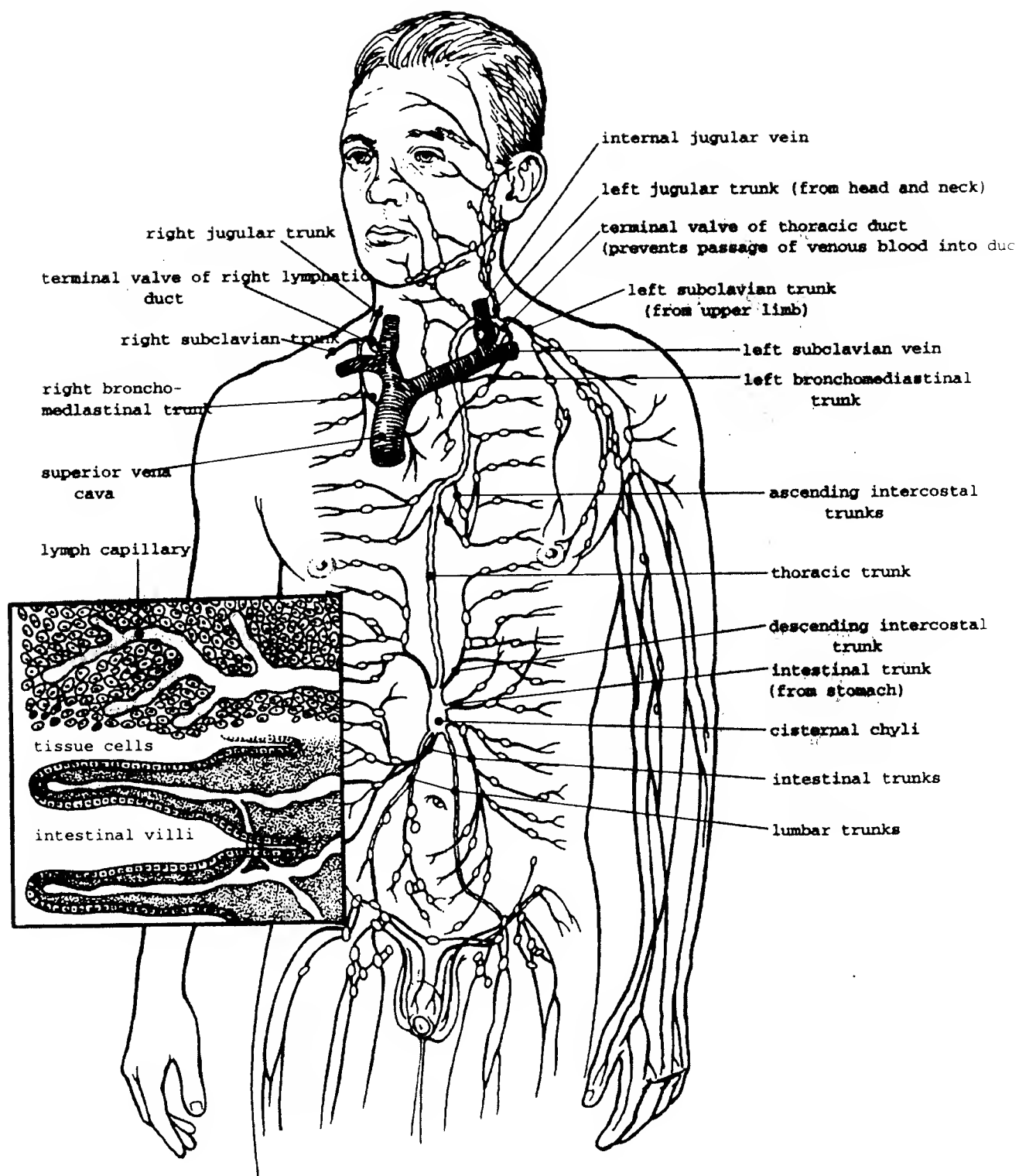


Figure 7.82 Fluid drainage and collection system.





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